

# EUROPEAN PATENT OFFICE

## Patent Abstracts of Japan

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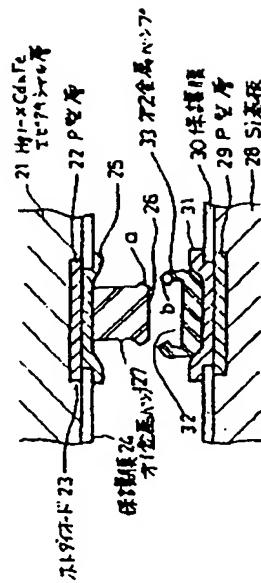
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APPLICANT : FUJITSU LTD;

INVENTOR : SUDO HAJIME;

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**TITLE** : SEMICONDUCTOR DEVICE



**ABSTRACT :** PURPOSE: To obtain a highly reliable semiconductor device which has been integrated at high density by a method wherein the head of a first metal bump is shaped to be protruding in a radius direction of the metal bump and a second metal bump to be connected to the metal bump is shaped to have a recessed part to be mated with a protruding part in order to prevent the metal bump from being extended in a lateral direction and in order to prevent the metal bump from being exfoliated from a substrate.

**CONSTITUTION:** Because a part extended in a radius direction of a head region 26 of a first metal bump 27 is coupled in a state that it is mated with a recessed part 32 of a second metal bump 33, they are connected surely. The second metal bump 33 is formed by using a shape memory alloy composed of a Ti-Ni alloy. Accordingly, even if the metal bump 33 is subjected apparently to plastic deformation and the recessed part 32 is extended in a transverse direction when the head 26 of the first metal bump 27 is put in the recessed part 32 of the second metal bump 33, the recessed part can be restored to an original state that the recessed part is not extended if it is heated again at a temperature of 110°C or higher which is a termination temperature of austenite transformation in case of an alloy composed of 50 atomic % each of Ti and Ni. The first metal bump 27 is composed of Al and its hardness is larger than that of the second metal bump 33; accordingly, when the head 26 is mated with the recessed part 32, a force is exerted in a direction which extends the recessed part.

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